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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

NOVEMBER 7, 1936

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See Page 297

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The Weekly Summary of

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Edited by WATSON DAVIS

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DO YOU KNOW?

Two seedless watermelons were produced in North Dakota at an agricultural experiment station this year.

Nickel tubing so fine that it passes easily through a needle's eye is made for such instruments as hypodermic needles.

German workers are being encouraged to cultivate silkworms in spare time, to help build up a German silk industry.

The Southwest experienced a 23-year drought in the years ending in 1300 A.D., causing suffering to Indian farmers in the pueblo region.

The pyramid idea has been applied to construction of a British block of flats, so that each floor can have a balcony open to the sun and air.

Soybeans, one chemist points out, are gaining such importance in this country that they may be ranked along with wheat, corn, and oats, as a "big four."

A Polish village, that stood on a marshy island about 600 B.C., has been unearthed; the streets and lower portions of houses are found remarkably preserved.

Scars in the Big Trees of California show traces of forest fires that broke out in the years 245, 1441, 1580, and 1797.

Wild Brazilian peanuts are being crossed experimentally with other peanuts at the Florida State Experiment Station.

Eskimos who build snow houses to sleep in when traveling can work so fast that a little house can be built in about half an hour.

Tests that are to last 20 years are being made, to see how fence materials stand up under various types of American climate conditions.

Airplanes were recently used with success to transport a valuable cargo of living chinchillas from Chile to California, for the fur industry.

A new product on the German market develops and fixes photographic negatives in one bath, thereby saving about 13 minutes in each operation.

Rubber boots for sheep are being made in five sizes in England, so that sheep being treated for foot-rot can better keep the medical dressings on their feet.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

ARCHAEOLOGY

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BIOLOGY

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DENDROLOGY

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ENTOMOLOGY

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PUBLIC HEALTH

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What germ turns cream puffs to poison? p. 292.

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VITAL STATISTICS

Are suicides increasing? p. 296.

PHYSIOLOGY-BIOCHEMISTRY

Work on Nerve Chemistry Is Honored With Nobel Prize

Discovery of Chemical Which Acts as Messenger From Nerve to Muscle Was Foundation for Honored Research

THIS YEAR'S Nobel prize in medicine and physiology has been awarded jointly to Sir Henry Hallet Dale, director of the National Institute of Medical Research in Hampstead, London, and to Dr. Otto Loewi, professor of pharmacology at the University of Graz, Austria, for their discoveries related to the chemical transmission of nervous activity.

Prof. Loewi's work is declared fundamental and original. Much of it would have been impossible without Sir Henry Dale's work on the chemical called acetylcholine, which Sir Henry found to act as messenger between nerves and muscles. Prof. Loewi's research in turn stimulated Sir Henry's later researches on this chemical.

There is thus an intimate connection between the work of these two investigators which justified a joint award. While their work is closely related, the two scientists have not collaborated directly.

The chemical and physiological phenomenon, the discovery of which won this high honor, occurs hundreds of times a second in the body of an active person. Every time a thought commands certain nerves in the body to move a muscle, there is an almost infinitesimal spurt of a chemical, called acetylcholine. This release of chemical acts as a chemical messenger, giving orders to the muscle from the nerve.

It is hard to imagine the small amount of this chemical that is needed to act as a chemical postman. And it is difficult to visualize the effect of the speed and complexity of the happening.

Sir Henry Dale on his most recent visit to America in 1934 estimated that each outpouring spurt of acetylcholine consists of three million molecules, a very small quantity. To express this weight in grams, the scientific unit of weight that is one-thirtieth of an ounce, it is necessary to write fourteen naughts to the right of a decimal point before a figure is reached.

Acetylcholine is thus recognized as one of the most important substances in the living body. Its potential usefulness in medicine is foreseen.

Sir Henry Dale is well known in America and he has lectured before universities and scientific societies here. He is considered one of the leaders in British science. He is now 61.

Dr. Otto Loewi is a man in middle life and he is recognized in America as well as Europe for his researches on nervous function, particularly on the transmission of impulses in the vagus nerve, a cranial nerve exercising important control over heart, lungs, stomach and other vital organs. He has been in the United States several times, most recently in 1930.

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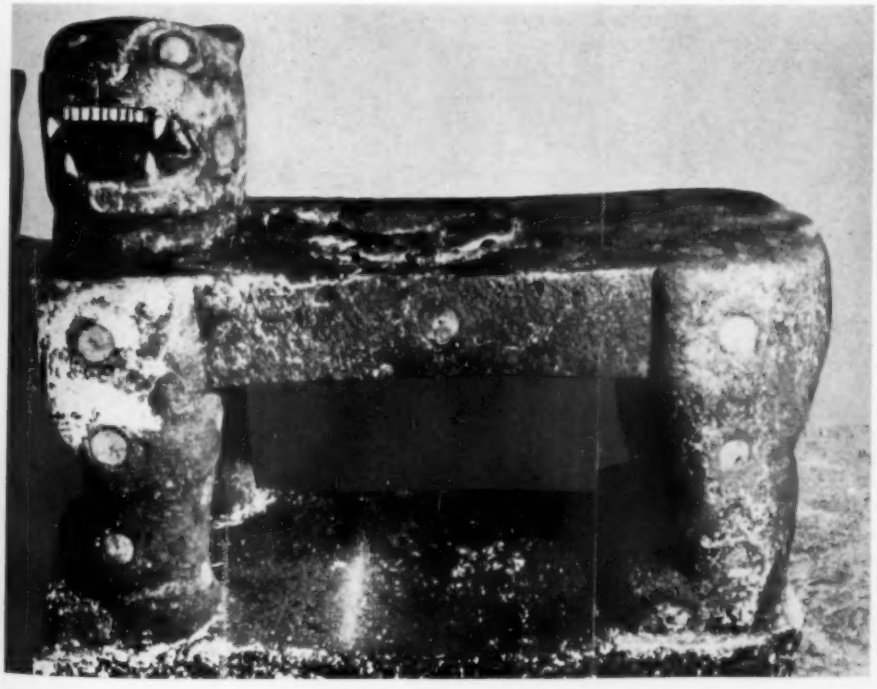

WHERE MAYAS WORSHIPPED

Centuries ago original Americans, the Mayas, worshipped at this strange altar just discovered. Note the precious turquoise plate on the red jaguar's back. Eyes and spots are represented by inlaid apple-green jade.

ARCHAEOLOGY

Jaguar Altar in Red Latest Mexican Find

A BIG stone jaguar painted brightest red, with eyes of fine apple-green jade, and with large body-spots of jade as well, has been discovered in a ruined Mayan temple in Chichen Itza, ancient Indian capital of Yucatan.

On the flat of the creature's back, which was evidently used as an altar-table, lay a tell-tale souvenir left by the hand of the last priest officiating forgotten centuries ago. This was a big round turquoise mosaic plate on which had been put a precious jade-and-shell necklace with a jade figurine. As an offering to the gods, the whole was burned with copal gum, the tropic Indian incense of Mexico.

But archaeologists who came centuries late found the damage was not great. The mosaic design was left in place, and this has now been repaired with shellac. The whole relic has been encased in glass by Mexican government archaeologists, so that visitors may always see just how the ancient offering had been left.

The sanctuary of the jeweled jaguar is the back room of a temple that once stood on a flat-topped pyramid. The front room, dug out just last year, has a huge reclining human form carved from stone, brightly (*Turn to page* 301)

PUBLIC HEALTH

Vaccine for Influenza Is Now Ready for Trial Use

Whooping Cough Vaccine Not so Successful in Test; Human Guinea Pigs Aid in Research on Food Poisoning

A VACCINE that promises protection against influenza is at hand, it appears from the report of Dr. Thomas Francis, Jr., of the Rockefeller Institute to the American Public Health Association.

A group of human volunteers has been vaccinated with human influenza virus vaccine. The vaccinations "took" so far as laboratory tests show. The blood of the vaccinated persons injected into mice kept these animals from getting the disease when flu virus was given them. The tests showed that the vaccinated persons had developed a supply of flu-fighting antibodies in their blood. The big question is whether these flu-fighters will protect a vaccinated person against the disease when an influenza epidemic comes along to give him a big dose of the virus that causes influenza. Another point to be settled is how long the flu-fighting antibodies will remain in the blood.

Whooping Cough Vaccine Fails

Vaccination against whooping cough does not protect children from the disease, in the experience of three Cleveland physicians.

Cases of whooping cough occurred about as often among vaccinated children as among unvaccinated, Drs. James A. Doull, Gerald S. Shibley and Joseph E. McClelland of Western Reserve University School of Medicine reported to the American Public Health Association.

Whether or not to vaccinate against whooping cough has long been as much of a question to physicians and health officers as to parents. Apparently it continues to be an unanswered question. Recently a new method of preparing the vaccine was developed and from first reports the new vaccination appeared successful.

The Cleveland physicians gave the new type of vaccine to 500 children between six and fifteen months of age. Another 500 children of the same ages were not vaccinated. Both groups were carefully followed for over two years, each case of whooping cough in either group being reported. Special nurses visited the homes of the children every four weeks to check up.

The number of cases of whooping cough was about the same in the two groups, the physicians reported.

The attacks were thought to be somewhat milder in the vaccinated children who got the disease, but this cannot be proved. The vaccine apparently is safe, for the only death that occurred among more than 120 children who got whooping cough was in a child who had not been vaccinated.

Auto Death Rates

Present methods of computing the death rate from automobile accidents are all wrong, in the opinion of Henry L. Porsche and Phillip Stein of the Chicago Board of Health. The number of automobiles in a city as well as the total population and the number of auto fatalities should be considered in estimating the automobile death rate.

This car-population method, they feel, gives a fairer death rate and a better method of judging the results of safety campaigns. By the old method, they explained, of computing the death rate according to the city's population, Milwaukee in 1935 had the lowest death rate of 12.2 deaths per hundred thousand population. Cleveland had more than twice as high a death rate and Los Angeles about three times as high.

But when number of automobiles are taken into the reckoning, the three cities rank about the same. Milwaukee and Cleveland each had less than one death per thousand cars. And Los Angeles just one death per thousand cars.

A large number of motor vehicles does not excuse a city for having a large number of automobile fatalities, no matter how they are reckoned, Dr. Arthur W. Hedrich of the Maryland State Health Department pointed out. Commenting on the new method of computing auto deaths, he said the chief thing to be considered is the number of lives that can be saved. Whether the new method would help toward this end seems, in his opinion, a matter of some doubt.

Swallow Germs

Human guinea pig experiments that helped to discover the germ that causes food poisoning were reported at the meeting of the American Public Health Association.

The germ has the scientific name of *Staphylococcus aureus* and is the same one that causes boils. The germ produces a poison which causes the sickness.

This germ was first found in custard filling sponge cake by Dr. G. M. Dack of the University of Chicago. Before his discovery, scientists had believed food poisonings were caused by other kinds of germs.

Cream puffs and other custard filled cakes are not the only kinds of food that harbor this germ, Dr. Dack pointed out in his report. The germs have also been found in many common foods such as cheese, gravy, doughnuts, milk, ice cream and meat sandwiches. Because these germs are always found in the air, it is extremely difficult to keep them out of food when it is being prepared.

The germs can be killed by cooking for a short time, however. Heating for fifteen minutes at a temperature of 156 degrees Fahrenheit kills them, and Dr. Dack found that reheating cream puffs or eclairs at this temperature does not spoil the flavor or appearance of the pastry and does make them safe to eat.

Both Dr. Dack and Dr. George A. Denison of the Jefferson County, Alabama, Board of Health reported experiments in which they fed some of the suspected germs to human volunteers. Some of them drank the germs in a glass of milk. They all had typical food poisoning symptoms of cramps, nausea, vomiting and diarrhea. Some were sicker than others, depending on the amount of germs in the dose they swallowed. These experiments helped to prove that the Staphylococcus is the germ of food poisoning.

Housewives and retailers of foods should be sure to keep custard filled cakes, gravies and the other incriminated foods in the refrigerator, it was pointed out. Even a few hours in a warm room will give the food poisoning germs a chance to grow and produce enough of their poison to be a menace to the health of those eating the foods.

Mice Fight Rabies

Development of a special breed of mice to help fight rabies was described by Dr. Leslie T. Webster of the Rockefeller Institute for Medical Research, New York City. By selection and cross-breeding methods, he obtained a strain of mice that are highly susceptible to rabies. These mice are used to diagnose rabies in doubtful cases and to test the effectiveness of commercial anti-rabies vaccines. Pasteur treatments prevent rabies deaths if given early enough after a person has become infected with rabies. But not everyone bitten by a dog needs Pasteur treatment. The dog may not have had rabies. If there is doubt about this, the mouse test will help to decide the matter, it appears from Dr. Webster's work.

One in Five Has Chronic Ills

Chronic sicknesses like heart disease and arthritis are an important cause of disability and unemployment. Figures on such sickness have been collected on a large scale for the first time by the U. S. Public Health Service. One out of every five persons has suffered from a chronic illness for three months or longer, the Federal Health Service's principal statistician, G. St. J. Perrott, reported. His figures were obtained in a survey of a number of large cities, and give a fair idea of the extent of chronic illness all over the country. One in ten of unemployed heads of households was unable to work because of serious disability due to chronic sickness.

Such figures show, Mr. Perrott pointed out, how an effective public health program is necessary for achieving economic security.

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SURGERY

Surgery of Abdomen Advanced by Research

NEW HOPE for better treatment and speedier recovery from severe abdominal conditions, including obstructions and peritonitis, is offered by reports being made to the American College of Surgeons.

A method of treatment of acute intestinal obstruction devised by Dr. Owen H. Wangensteen of Minneapolis, Minn., is hailed as one of the greatest contributions to surgery in recent years. It consists in using continuously a stomach tube to reduce the internal pressure in the distended abdomen. Dr. Wangensteen gave the assembled surgeons the technical details of his decompression method.

In discussion, Dr. Thomas A. Shallow of Philadelphia declared that the Wangensteen method has added to the operative safety of patients with acute intestinal obstruction and to the postoperative comfort of patients without intestinal obstructions to such a degree that it has now replaced all methods used in the past.

"While Dr. Wangensteen does not make any claim for the cure of peritonitis by means of this method of treatment," he explained, "I am strongly of the belief that many cases of peritonitis are made exceedingly comfortable and the balance is cast in favor of a certain number of a group by the use of the decompression mechanism."

Peritonitis is the acute inflammation of the lining of the abdominal cavity.

"The most serious problem which confronts the abdominal surgeon today is the distended abdomen associated with acute intestinal obstruction," Dr. Shallow continued. "Even in the hands of the most skillful surgeon or the best technician, the distended abdomen in acute intestinal obstruction is a nightmare. In the past, all of us have attempted to fight our way across the pushing coils of intestines to isolate, diagnose and release the cause of obstruction. In our effort, we produced shock and we traumatized tissue to such a degree that, even in successfully performed operations, a fatality occurred.

State of Storm

"It might be said that we entered the abdomen in the state of storm to launch our surgical ship into its depths. The introduction of the Wangensteen decompression principle has made it possible for us to enter the abdomen in a calm, to carry the individual through the storm without the danger of gangrene, rupture, or permeation of the bowel. It has made it possible for us to reach the area of obstruction under direct vision and with proper exposure, then to exercise our surgical skill and judgment in overcoming the obstructing agent. All of these surgical principles have been accomplished after due consideration of the physiologic factors and the pathologic processes which exist, so that the operative delay has not been deleterious to the patient.

"Dr. Wangensteen has clearly shown that the permeability of the intestinal wall, the rupture of the vessels and the development of gangrene all pass through stages of circulatory dysfunction. This begins with a gradual increase in pressure in the capillaries and ends when the intramural intestinal pressure exceeds that of the systolic vascular pressure. He establishes beyond question that rupture, permeability and gangrene can be prevented."

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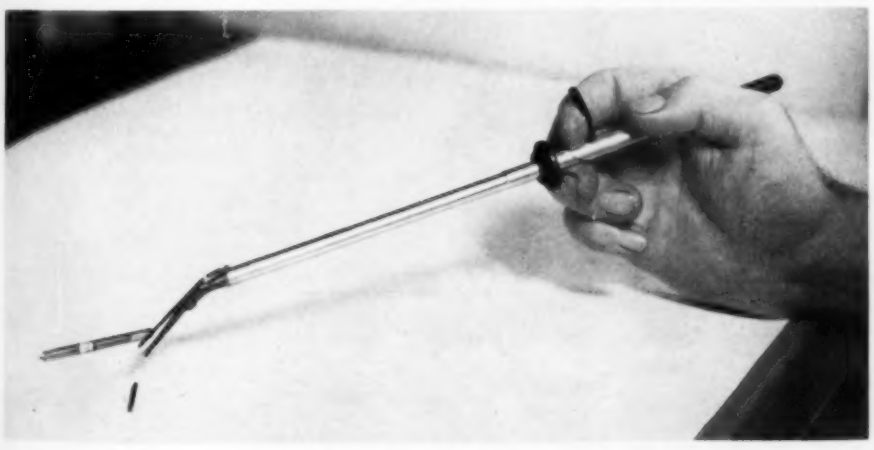


TO HANDLE RADIUM

Scientists of the National Bureau of Standards at Washington are protected from the deadly radiation of radium and other radioactive substances by use of these new forceps for handling the tiny but dangerous and costly packets tested there. Specially designed by Dr. L. F. Curtiss, they are light weight and keep the hands as far removed from the radium as possible. Many investigators in the early days of radium's use received burns because of lack of adequate handling apparatus.

So common is diabetes, that in New York City there are said to be between 50,000 and 100,000 persons with this disease.

PHYSICS

Build Mental Model Stars To Simplify Stellar Problems

Physics Societies Learn of Vibration Danger to Airships, Communication and Acoustical Problems

MANY of the problems of astronomy are so big that they must be mentally simplified before astronomers can even start to try to solve them, declared Dr. Henry Norris Russell, Princeton University's professor of astronomy, at the meeting of the five founder societies of the American Institute of Physics. Prof. Russell delivered the noted Josiah Willard Gibbs lecture of the American Mathematical Society on "Model Stars" at this New York meeting.

Showing how astronomers go about simplifying their intricate stellar problems, Prof. Russell chose a typical example.

"What would happen," he asked, "to a large mass of matter left to itself in space?"

"If we could solve this completely, and work out the special case of our solar system in all detail, we would not have to bother with straw-votes or Presidential polls. To get something we can handle mathematically, we must take a single body, forget that it is rotating, and forget that the 90 different kinds of atoms of which it may consist may be present in different proportions in various parts—or, to be polite, assume that the material is 'thoroughly mixed.' The problem can then be solved for a 'cold body' which has lost into space all the heat that could possibly be got out of it.

White Stars

"For a small body of a cubic mile or less, this would be a lump of rock, ice, or solidified gas. For a very large body, as massive as the sun, the matter would be 'degenerate' and very dense. The atoms would be ionized, or deprived of their outer electrons, by the enormous internal pressure. The white dwarf stars, like the companion of Sirius (which is about 30,000 times as dense as water), represent an approach to being final condition.

"A completely cold body, whatever its mass, cannot be larger than a certain size. This has been calculated by the East Indian physicists, Kothari and Majumdar, as 25,000 miles in diameter, for a mass about one two-hundredth that of the sun.

"For a body which still contains internal heat, we do not yet have data enough for an exact solution of the problem. Various assumptions lead to different 'model stars,' all of which are probably like the real stars in some ways, and none of them exactly like them."

The source of the energy which stars are continually pouring into space as radiation, said Prof. Russell, is now generally agreed to be caused by transmutation of light hydrogen into heavier elements; with the possibility that the newly-discovered neutrons may also share in a similar building-up process.

"If only we knew in full," continued Prof. Russell, "the laws which govern this process—or set of processes—we could calculate what the stars ought to be like—if we knew what sort of atoms were present in them, and in what proportions. But we know neither of these things yet."

On many fronts, Prof. Russell indicated, astronomy which studies the gigantic things in the universe—the stars, nebulae, and super-galaxies—is therefore waiting, paradoxically with patience and hope, for the nuclear physicist to make discoveries of the most minute things in the universe—atoms, the cores of atoms, and electrons. Can neutrons exist in stellar interiors? Little hope is held of finding out with telescopes. The laboratory of the physicist is a much better place.

Vibration Prevention

Quelling dangerous and annoying vibration is a major contribution of the science of physics to industrial progress, declared Dr. J. P. Den Hartog, associate professor of applied mechanics at Harvard University.

The near-fatal flight of the Graf Zeppelin in 1929 when the shafts on four out of five of its motors snapped in a gale over France is the outstanding example of what may happen when vibration is not considered and guarded against, said the Harvard scientist.

In every form of transport using internal combustion engines, he pointed out, there is a terrific force on the motor shafts because the power is applied in a series of shocks by the explosions within the cylinders.

Referring to the Graf Zeppelin's hairbreadth escape, Dr. Hartog added:

"Upon inspection of the only surviving engine a large crack was found in its shaft which would have made its failure certain within an hour.

"The reason for this near-disaster was a 'coupling' between the engines and their propellers which made their calculation quite difficult, but the engines had been thoroughly tested and found in good order. Just before the fatal trip, however, the motors were overhauled and a few bolts were tightened up in the coupling to take out the 'play.' This changed the system sufficiently to cause the dreaded 'resonance,' with its inescapable result. It goes without saying that everybody concerned with these problems learned a valuable lesson from this case."

A new type of vibration damper developed only recently, Dr. Hartog disclosed, helps to combat this problem. A piece of metal is attached loosely to the motor shaft between two pins so that it can be moved about one-quarter of an inch when the shaft is at rest.

When the shaft is turning, the piece of metal, weighing several pounds, vibrates back and forth and gives shocks to the shaft. The apparatus is so designed that these intentional shocks just counterbalance the shocks coming from the cylinders so that the engine runs smoothly and safely even at the "critical speeds." Airplane engines were the first application and now other uses are being found for the novel technique.

Voice Sorter

How crystal filters sort out the hundreds of voice speeches traveling simultaneously over the new type coaxial telephone cables was described by Dr. O. E. Buckley, director of research for the Bell Telephone Laboratories.

The crystal filter was chosen as an example by Dr. Buckley to typify the blending of different research achievements of many men over many years into a single piece of telephone equipment.

Initial physical discovery in the development of crystal filters was the observation of the piezo-electric effect first noted by the brothers J. and P. Curie in 1880. They found that when certain crystals were compressed opposite elec-

tric charges appeared at each end. It was not until vacuum tube amplification came into being that a practical use could be found for the phenomenon.

Submarine detectors were developed during the World War by Prof. Langevin in France and A. M. Nicholson in America which were the first practical application. Prof. Walter G. Cady of Wesleyan University recognized the value of quartz crystals, with their piezoelectric effect, as a source of constant frequency. Most good radio stations now use such crystal controls on their broadcasting transmitters.

Value of the crystals as sorters for myriads of telephone messages going over the same cable lies in the fact that by cutting the crystals to known dimensions and shapes they can be made separately sensitive to but a single frequency. Thus as many messages can be sent simultaneously as there are different frequencies going over the cable.

The crystal filter, which is a simple enough device, illustrates, said Dr. Buckley, the importance of "keeping at it" in industrial research and the importance too of cooperation between scientists.

Musicians Help Scientists

Probably without knowing all the reasons why, six professional musicians have been playing selections for scientists at the State University of Iowa to make possible research on the tones of violins.

This was revealed in the report to the meeting of the Acoustical Society of America by Dr. Paul C. Greene. The purpose of the study was to see if violinists, in unaccompanied performances, played typically in the natural or equally tempered musical scales.

Actually it was found that they played in neither one when their violin tones were turned into electrical currents and made visible on an oscillograph.

Musicians will wish to know "that compared with both natural and equally tempered intonation the violinists tended to expand their major seconds and thirds and perfect fourths tended to approximate the theoretical scale values for that interval."

Ear As a Loudspeaker

The human ear can act as a radio loudspeaker, converting the impulses coming in on an ordinary radio set into music, Dr. S. S. Stevens, of Harvard University's Psychological Laboratory, told the Acoustical Society of America. This sort of electrical hook-up is not likely to serve as a substitute for hearing, however, Dr. Stevens predicted. Although the music can be heard and popular tunes readily identified, the quality is not rich but rather like "tin-pan" music. Nevertheless, there is the advantage that radio advertising is eliminated; speech can be recognized as speech, but only occasional words can be understood.

In Dr. Stevens' experiments, ordinary alternating electric currents were introduced into the ear by means of an electrode placed in the ear when it was filled with a salt water solution. The alternating current was converted into sounds that could be heard. The theory that the basilar membrane of the ear carries a sufficient electric charge so that it is able to respond mechanically to an alternating electrical potential is regarded by Dr. Stevens as a reasonable explanation of this phenomenon.

"We know that the ear behaves as a condenser microphone in the sense that sound energy is transformed into electrical energy," he said. "The present hypothesis suggests merely that the ear, like all condenser microphones, is capable of the reverse process of converting electrical into mechanical energy."

Thus the ear can be both microphone and loudspeaker, transforming mechanical energy into electrical impulses and back again into sound.

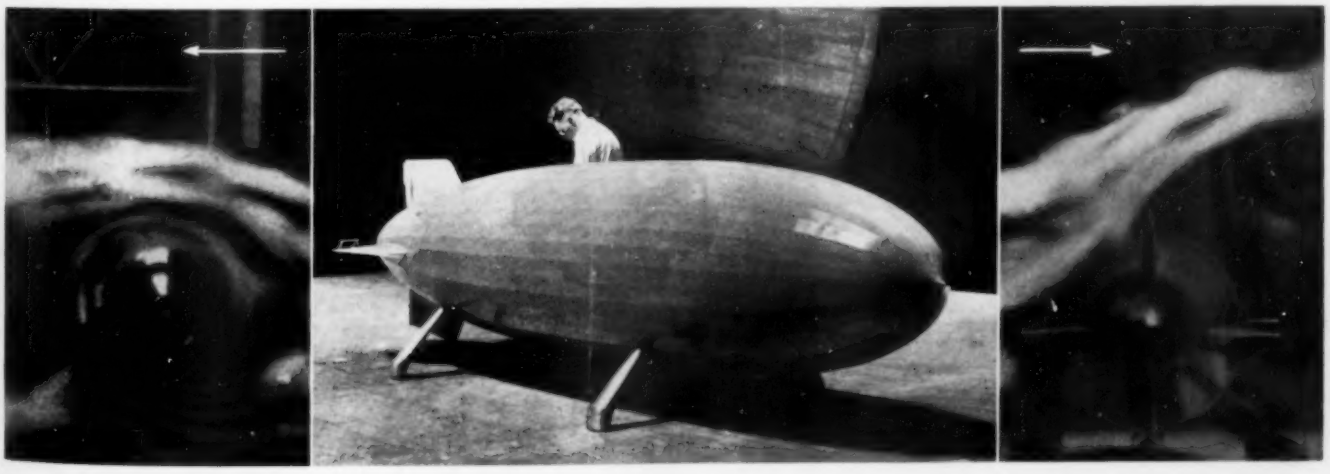
Judge Pitch Differences

It is possible for a person to listen to a tone and then to regulate the frequency of a second tone until it is just half the pitch of the first, the meeting learned from another report by Dr. Stevens in collaboration with Dr. J. Volkmann of Harvard and Dr. E. B. Newman of Swarthmore College.

Although several (*Turn to page* 302)

TEST LANDING FORCES

With their giant full-scale wind tunnel, air streams up to 100 miles an hour and liberal supplies of smoke, scientists at the government laboratories of the National Advisory Committee for Aeronautics have now investigated the amazingly large air forces occurring when some giant airship like the Hindenburg or the ill-fated Akron or Macon is landing. Shown below (center) is a model of the late S. S. Akron in one-fortieth actual size. In the background can be seen part of the giant wind tunnel, large enough to hold full-sized Army and Navy combat airplanes for study. The large platform, bigger than many a night club ballroom floor, simulated the ground of the landing field for the airship wind tunnel tests. At left the airship model is shown head on with smoke curling over it to make visible the airflow during the recent tests. At the right is the tail of the Akron model showing the different shape of the air currents. It was found that in an airship the size of the Hindenburg or Akron the landing forces in a 20-mile-an-hour wind may be as large as 25,000 pounds in lift and 60,000 pounds in lateral force.



PSYCHIATRY

Long-Winded Speeches Get Start in Babyhood

A POLITICIAN'S long-winded speech may have had its earliest beginnings when he was an infant and became angered over an interruption at mealtime, Dr. Ernest E. Hadley, psychiatrist of Washington, D. C., told a meeting of the American Institute of New York City.

Babies are so sensitive to the way they are treated by other persons that nurses can immediately tell the unwanted baby from the wanted one by the infant's behavior when it is with the mother, Dr. Hadley disclosed.

If the baby is feeding, and a telephone bell causes an interruption, the infant is naturally resentful. Then if the mother is patient and understanding, the baby may be pacified, but if she, too, becomes exasperated the baby may refuse to go on with the feeding. There is begun the later "feeding problem" that harasses so many baby specialists, parents, and nurses.

The refusal of food often carries over into refusal in general of all suggestions or commands and the baby is said to be suffering from "negativism." In adult life it shows up in many curious and apparently remote ways.

Excessive drinking and smoking have been traced to this original cause, as has excessive speaking. These act as a sort of compensation for the unconscious hostility toward sucking. On the other hand, loss of appetite is also likely to be one of the after effects. The adult who has developed this negativism in infancy may refuse not only to eat, but to kiss or even to speak pleasantly. It may affect any activity connected with the mouth.

Science News Letter, November 7, 1936

MEDICINE

Soot in City Air Seen as Possible Cancer Cause

SOOT-LADEN city air may be causing cancer of the lungs in the inhabitants of cities. Conclusive evidence for this is lacking, but strong circumstantial evidence is brought forward by Dr. M. G. Seelig and E. L. Benignus of the Barnard Free Skin and Cancer Hospital, St. Louis, in a report to the *American Journal of Cancer* (September).

Human death records and animal studies furnish the evidence with which the St. Louis scientists pin the guilt of causing cancer onto soot in the city air.

Figures from the U. S. Census Bureau show that lung cancer deaths are more numerous in cities than in rural areas. The relation between the greater number of deaths and the greater amount of soot in the air is close enough, the scientists state, "to warrant more activity on the part of public health authorities in the various anti-smoke campaigns."

The tar in soot and the way soot invades all the structures of the lungs make it capable of causing cancer. Tar itself has long been recognized as a cancer-causing substance. Chimney-sweeps' cancer has been traced to the irritation produced by tar encountered in the course of this occupation. Tar painted onto the skin of mice causes cancer. Whether or not tar, breathed into the lungs with sooty air, could cause cancer, as the death statistics suggest, was the problem the St. Louis scientists set out to solve.

For mice apparently it can and does, which strengthens the assumption that it does also in the case of man.

In a group of mice that lived in a sooty atmosphere over a long period of time, eight out of a hundred developed lung cancer. By contrast, two out of a hundred developed lung cancer in a group that lived in a soot-free atmosphere. The soot was secured by sweeping the flue of the hospital furnace which burns Kentucky bituminous nut coal.

Science News Letter, November 7, 1936

ARCHAEOLOGY

Early Palestine Favored Heads Bulging in Back

THE CURIOUS fashion of shaping one's head to make it bulge high at the back was known to early inhabitants of Palestine, so British archaeologists digging at ruins of Lachish have discovered. (*Discovery,* August.)

Several skulls, apparently pressed and bound to this shape in the pliant stage of childhood, have been unearthed. They are believed to date from an earlier time than the conquest of the Promised Land by the Israelites.

The odd-shaped skulls are pronounced by archaeologists similar to the head of the famous Pharaoh of Egypt Akhnaton, whose family had this peculiarity, though whether the Egyptian king's long head was naturally deformed or intentionally so has long been debated by scientists.

Science News Letter, November 7, 1936

IN SCIE

BIOLOGY

The Earth Is Alive With Minute Animals

STRIKING new figures on how much life there is in seemingly dead earth have been produced by Dr. G. Frenzel of the Breslau Zoological Museum. He made a count of a number of soil samples taken at the depth of about a foot, in rather dry, sandy meadowland. Of one-celled animals he found nearly 150 million per square yard, and of many-celled forms, principally small insects and mites, approximately 90,000. Bacteria and other forms of plant life were not included in his count.

Science News Letter, November 7, 1936

VITAL STATISTICS

Fewer Suicides This Year; Auto Killings Decrease

HOMICIDES and suicides both show a decline so far this year, the latest figures of the Metropolitan Life Insurance Company's experience with industrial policyholders show.

"Suicide tends to vary inversely with business conditions," Dr. Louis I. Dublin, third vice-president and statistician, commented. "Whether the present decline in the suicide rate is to be viewed in this light, it is too soon to judge. But the fact is that the suicide rate is back at its 1929 level for the first nine months of the year."

Fatal accidents, which tend to increase with the revival of business, have risen from 54.6 to 58.2 per 100,000 since the corresponding period of last year. This increase has been in fatalities other than from automobile accidents.

Auto fatalities for the entire period of nine months are still below the figure of last year, but this is because of conditions in the early months. In fact, the favorable 1936 record is no doubt due to the reduced automobile traffic last winter during a period of heavy storms. The last quarter has shown a turn for the worse, and the rate for these months alone has been higher than last year.

Science News Letter, November 7, 1936

FIELDS

DENDROLOGY

Big Trees Find Age Rival In Sierra Mountain Juniper

See Front Cover

CALIFORNIA'S famous Big Trees, commonly rated as the oldest and largest living things, now have a rival, for age at least, in another California tree, a gnarled old juniper that grows near Hillsborough, Calif., in the high Sierras of Tuolumne County.

This veteran tree has been studied by Dr. Waldo S. Glock of the Carnegie Institution of Washington, who was guided to it by Clarence K. Bennett of Hillsborough. Dr. Glock took several samples of its wood with a core-cutting borer, and carefully counted the annual rings. He figures a conservative age for the tree at 3,000 years. This compares closely with the greatest age known for a Big Tree, 3,250 years.

The Bennett Juniper grows in a wind-swept place at an elevation of about 8,500 feet. The combination of exposure and the natural slow rate of growth of junipers has kept it from attaining anything near the size of the Big Trees. It is only about 80 feet high, but its trunk measurements are impressive: 21 feet 6 inches at the ground, with an average diameter of 14 feet 2 inches five feet above the ground.

The slowness of its growth shows up strikingly in Dr. Glock's borer cores. During the past 700 years the tree has added only two feet to its diameter.

Science News Letter, November 7, 1936

ENTOMOLOGY

Riddle of Butterfly's "Trunk" Is Explained

BUTTERFLIES and moths uncoil their long probosces, or "trunks," on very much the same principle as that used in the toy paper "snakes" that startlingly dart into your face at carnivals or parties, blown out of a tight coil by the breath of some fellow-reveler. This simple mechanical explanation of one of biology's most difficult riddles has been discovered by Dr. J. B. Schmitt of the University of Delaware.

A butterfly's proboscis is not a simple tube or pipe. It is made of two trough-shaped sections, held together at the edges, so that it "adds up" as a tube through which the insect can suck up flower juices.

In each half, beneath the trough, there is a tube, closed at the outer tip, but communicating with the head-cavity at its base. Each of these tubes is filled with blood. Normally, the proboscis is kept coiled by the pull of many short muscles, arranged diagonally. But when the insect is ready to feed, a valve closes at the base of each tube, preventing the blood from flowing back into the head. At the same time, certain muscles squeeze down on the base of the tube, like a hand on a rubber bulb. This puts pressure on the fluid, which has nowhere to go but out, so that it pushes out into the tube and straightens it.

Science News Letter, November 7, 1936

CHEMISTRY

Gelatine Is Detected When Added to Cheese

GELATINE added to cottage cheese, cream and other dairy products to make them look thicker and richer can now be detected with ease and certainty, so dairy scientists report.

The new method, devised at the University of California College of Agriculture, is applicable to all dairy products. Heretofore only raw sweet milk and raw sweet cream could be adequately tested for gelatine. Trichloracetic acid is used in the new test.

Science News Letter, November 7, 1936

ARCHAEOLOGY

Dream Book Is Relic From Ancient Egypt

A NEW and unique relic from ancient Egypt is a dream book used over 3,000 years ago, to advise whether dreams were good or bad. (*Antiquity*, September.)

The book, which archaeologists call very remarkable, lists various things that an Egyptian was likely to dream of. Each item is followed by the terse verdict: "good" or "bad."

If an Egyptian dreamed of binding fast baleful men at night—good. It meant defeat of his enemy. To dream of munching a cucumber—bad. There would be a quarrel.

The book is one of 18 papyrus manuscripts which the British Museum has just published.

Science News Letter, November 7, 1936

PHYSICS

Ozone Closer to Earth Over the Polar Regions

THE stratosphere's ozone layer is closer to earth in the polar regions than over the equatorial portion of the earth, Dr. E. Regener of Stuttgart, Germany, concludes (*Nature*, Sept. 26).

Dr. Regener, who is famous for his cosmic ray studies, sent up sounding balloons, which took samples of the air at heights up to 18 miles and brought them back to earth. At this height there is a deficit of 2 to 3 per cent of the air's oxygen content. Above 12 miles there is considerable variation in oxygen content of different samples. Dr. Regener attributes this to the weather conditions.

The lower ozone layer at the poles is probable, Dr. Regener said, because of the decrease in oxygen content at lower heights over the poles than at the equator and because the greater stability of the atmosphere in the polar regions tends to increase the diffusion of the heavy ozone downward.

Ozone in the atmosphere acts as barrier to some of the most actinic of the visible and invisible rays of the sun.

Science News Letter, November 7, 1936

BIOLOGY

Gas From Apple Skins Stops Potato Growth

THE skins of ripe apples, pears, and hawthorn fruits produce a gas that keeps potatoes from growing, Dr. O. H. Elmer of the U. S. Department of Agriculture has found.

Dr. Elmer measured a large number of the effects that this gas, produced by the living skin of sound apples, has on potatoes. He found that the respiration of the potato was speeded up, and consequently the activity of all the other processes directly connected with the potatoes' respiration was also increased.

Sufficient concentration of the gas stops potatoes from sprouting, and keeps them well preserved for long periods of time, the experiments show. Chemical investigation disclosed that the unknown gas was ethylene. Interestingly enough, this gas has for some time been used by produce experts to keep citrus fruits while in transit, and to aid in ripening them.

Science News Letter, November 7, 1936

Bribery and kidnaping were crimes tried in courts of Mesopotamia, 1500 B.C.

PUBLIC HEALTH

On Guard Against Germs

Airplanes Must be Watched for Invading Enemies That May Carry Deadly Disease in Slender Insect Bodies

By JANE STAFFORD

THE housekeeper's vacuum cleaner and insect spray gun have been adapted for use as weapons of defense against disease-bearing stowaways of the air. It might seem humorous if the situation were not so grim.

These domestic tools, in a form specially designed for the purpose, are being used by the U. S. Public Health Service's quarantine officers to keep mosquitoes carrying yellow fever or malaria from riding the airliners into the United States.

Yellow fever seems remote and unimportant to most of us living in the United States today. You may remember hearing your father or grandfather speak of the dreaded Yellow Jack, and you have thrilled to the drama of its conquest by a team of U. S. Army doctors. But that was over thirty years ago—ancient history. And as for malaria—if you live in certain regions of the South you take it for granted, and if you live in the North it seems almost as remote and unimportant as yellow fever.

The secure feeling that comes from thirty years' freedom from yellow fever is rudely shocked by the knowledge that this disease is only two days away and is raging uncontrolled at that two-days-off locality. Public health authorities are seriously concerned over the situation and even more worried over the malaria problem.

New Carrier

Here is the picture they see: Yellow fever, wiped out of our country, and beaten back from Central America, was at its last stronghold in the northeast of Brazil. It was thought to be rapidly disappearing from the South American continent as a result of anti-mosquito services in a few of the larger cities. Then came reports from the International Health Division of the Rockefeller Foundation stating that "yellow fever is widely disseminated over the continent east of the Andes and north of Paraguay."

Brazilian jungle fever, the "fever of the engaged men" as it is known locally, has turned out to be the old dreaded Yellow Jack. (It got its romantic local name because it chiefly attacks young, about-to-be-married men who have gone into the jungle to build homes for their prospective brides.) The Rockefeller Foundation scientists, down there in an attempt to clean up the last traces of yellow fever, stumbled on this discovery and on another unpleasant one: the jungle yellow fever is carried by a different kind of mosquito than *Aedes aegypti,* the classical yellow fever mosquito, and has different breeding habits. This complicates the fight against it considerably, since entirely new methods may have to be developed. There is scant hope at present of conquering or even controlling it.

Malaria Approaching

To U. S. health authorities, an even more serious aspect of the picture is the malaria problem. An African malaria mosquito, a rank foreigner, has gained a foothold in Brazil, two days away from us by plane. If this mosquito should be carried to the United States it would present a problem in malaria control far greater than any we have ever faced and one for which our present methods of malaria control would be totally inadequate. On top of this, there is Hawaii to be thought of. This delightful vacation spot has had some disease problems of its own but malaria is not one of them because there are no Anopheles mosquitoes on the island to spread the disease. Health authorities are greatly concerned over the possibility of even one or two of these malaria-bearing mosquitoes being taken to the islands from the mother country which is now only eighteen hours away by plane.

Officers of the U. S. Public Health Service, entrusted with the job of protecting us from importation of disease, realized as soon as commercial air travel started between the United States and Central and South America that they had a new problem on their hands. There are really two problems, or two parts of the problem. One relates to danger from human passengers and the other to danger from mosquito stowaways. It is for the latter that Drs. C. I. Williams and W. C. Dreessen adapted the housekeeper's tools into effective defensive weapons that do not interfere with the speed and comfort of the new fast method of transportation by air.

Infected Passengers

In the case of the human passenger, air travel brings him from one continent to another so quickly that he might leave South America perfectly well but harboring yellow fever germs from an unsuspected mosquito bite, and arrive in this country, still apparently well, only to develop the disease days after his arrival. He might then be the means of spreading the disease to others, since the mosquito that carries yellow fever still exists in this country, though, without any yellow fever patients to bite, it cannot get and spread the infection.

If a yellow-fever-infected mosquito hopped an airliner for a stolen ride into this country and disembarked undetected, it and its brothers and sisters already here could infect enough persons to provide the nucleus of a good-sized epidemic before anyone knew what was up.

That this is actually possible was demonstrated by studies conducted by Drs. T. H. D. Griffits and J. J. Griffits of the U. S. Public Health Service, with the cooperation of officials of the Pan American Airways System. They found, in the first place, that there are plenty of places on the planes where mosquitoes can stow away undetected by ordinary observation, and examination of some hundred planes on their arrival at Miami from foreign and insular ports resulted in discovery of a number of mosquito stowaways, among them the yellow fever kind. The next step was

BUSY

The mosquito that spreads malaria, seen in the act of sucking blood.

HEALTH INSPECTION

Quarantine officer of the U. S. Public Health Service at Alameda, Calif., going aboard the China Clipper to look for mosquitoes or other signs of disease that might be imported by air.

to collect a hundred yellow fever mosquitoes—the type capable of spreading the disease, but not infected with it—and paint them yellow by spraying with a yellow dye from an atomizer, for identification purposes. These were placed aboard a plane at San Juan, P.R. Of the hundred mosquitoes, a score were found still on the plane when it landed ten hours later at Miami, 1,250 miles away.

Drs. Williams and Dreessen then took up the problem of keeping these mosquitoes from riding the airlines, or at least from landing in the United States. One way of doing this would be to destroy the mosquitoes on the plane during the flight. For this, it is necessary to have a mosquito-destroyer that will not involve any hazard to passengers or pilots, that is easy to operate and light in weight. One such substance, the public health officers considered, is pyrethrum in kerosene. This is the basis of many insecticide sprays. It is comparatively harmless to humans and in low concentrations in the air it will kill the yellow fever mosquito, *Aedes aegypti.*

Fire Hazard

The disadvantage of this mosquito killer is that it catches fire easily, which makes it unsuitable for use in a plane. So Drs. Williams and Dreessen mixed up an insect spray in which carbon tetrachloride, which is not only not inflammable but is used as a fire extinguisher, was substituted for kerosene.

This mixture was sprayed into a sealed room in which cages of pure-bred *Aedes aegypti* were placed. When enough of the mixture was sprayed to reach a concentration of between 40 and 60 parts per thousand cubic feet of air, it killed the mosquitoes, but was irritating to the men who stayed in the room during the spraying to watch the effect on the mosquitoes. So this spray had to be abandoned as impractical for use in passenger planes.

Safe Mixture

The next step was to test various mixtures of two kinds of sprays, pyrethrum-in-carbon-tetrachloride and pyrethrum-in-kerosene. To their surprise, the experimenters found that when the kerosene portion of the mixture was as little as one-fifth, the spray was just as effective in killing the mosquitoes as when much larger proportions of kerosene were used. This proportion sprayed into the air at a concentration of only a few drops per thousand cubic feet of air killed all the mosquitoes in the experimental room within five minutes. There is so little kerosene in the mixture that there is no danger of its catching fire and so little carbon tetrachloride that it is not irritating to man. It is a little heavier than similar insect sprays so it must be sprayed under slightly higher pressure.

Present practice is to spray the planes with this mixture, using a spray gun such as the housekeeper uses in her war on moths, flies and other insects. A more effective method might be to supply the planes with a very small aluminum pipe, enabling the pilot automatically to spray the plane periodically. Increased pressure could be obtained by using compressed air from the airstream of the propeller. In a research laboratory at Miami, public health engineers, working in cooperation with the airline, are trying to work out the best method of using the spray on the planes.

Vacuum Cleaner

This spray mixture of pyrethrum, kerosene and carbon tetrachloride should do the mosquito-killing job effectively, and with no hazard or discomfort to pilots or passengers. One difficulty, however, is to get the spray into every enclosed space on the plane. Spraying the cabin and the pilot's compartment is not sufficient, as the mosquito stowaways can hide in the closed parts of the wings and fuselage. The vacuum cleaner feature comes into use at this point, in order to test the efficiency of the spraying done on route.

When the plane lands, it as well as its passengers must be inspected by the quarantine officer of the U. S. Public Health Service. To help in the search for mosquito stowaways, a sanitary inspector goes over every bit of the plane with a vacuum hose covered with a screen of cotton. Any lurking mosquitoes that escaped the spray will likely be caught by the vacuum line and will show up on the cotton screen. If more than one mosquito is found on ten planes of any one airline company, the company will be warned by the U. S. Public Health Service that it is not doing the mosquito-killing job thoroughly enough. If mosquitoes are persistently discovered, the federal health officers will hold the plane, immediately on its arrival, for mosquito search and destruction, before mail or passengers may be taken off. So far, however, these drastic steps have been unnecessary, as the airlines have been extremely cooperative about the disease-fighting measures.

Human to Mosquito

Keeping yellow-fever-infected persons out of the country is another problem. There is no way of telling that a person has been infected with this disease until he comes down with it six days later, which gives plenty of time for him to reach one of the Southern cities where the majority of the native mosquitoes are the yellow fever kind. Some of them are pretty sure to bite him and suck up the yellow fever virus which

they will pass on to their next victim. Health officials in other countries are just as concerned as our own about this problem. The British in India are especially worried, since the yellow fever centers in Africa have been brought so close by air travel. India also has countless numbers of the yellow fever mosquito. In addition her millions of people have probably no resistance at all to the disease, which has never appeared in that country, and it is impossible to enforce throughout the country sanitary regulations such as screening of houses and isolation of the sick. Importation of one yellow-fever-infected human or mosquito would probably mean disaster in India.

International Pact

To avoid such catastrophe, Great Britain along with the United States and about twenty other nations have signed an International Sanitary Convention for air travel. The signatories have agreed to keep persons from yellow fever areas under surveillance, before they board a plane, for a long enough period to determine whether or not they have been infected and are about to develop yellow fever.

While these precautions are in effect, scientists are at work seeking still better methods of protection against yellow fever. This search has gone on almost ever since Walter Reed and his men found what is still the only practical method of prevention: blocking the route between yellow-fever mosquitoes and man. Even this method, which is also a malaria preventive measure, is only practical in settled regions. In the African and South American jungles it is practically impossible to apply anti-mosquito measures.

16 Eminent Scientists Trace the False Leads in the Stages of Science

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A protective vaccine against the disease is what scientists have hoped for. The search for this has been shadowed by tragedy. Despite all precautions, the men engaged in the research ran a fearful risk. Over a score suffered attacks of yellow fever, and five gifted scientists, Adrian Stokes, Hideyo Noguchi, William A. Young, Paul A. Lewis and A. Maurice Wakeman, lost their lives. The search went on, however, other scientists picking up the work where the last martyr had unwillingly dropped it.

Eventually success crowned the brave and daring efforts. A successful vaccine was developed by Drs. W. A. Sawyer, S. F. Kitchen and Wray Lloyd, working in the laboratories of the International Health Division of the Rockefeller Foundation. The trick was turned by mixing yellow fever virus, greatly weakened by passage through hundreds of mice, with human immune serum, that is, blood serum of persons who had recovered from yellow fever. This vaccine was used successfully on members of the Rockefeller staff engaged in yellow fever work, and since its development no more cases of the disease have been acquired in the course of research on it, either in the laboratory or in the field.

Disadvantages

This vaccine had certain disadvantages. One, resulting from the fact that the virus had to be weakened by passage through mice, has been overcome by development of a method of growing the virus on tissue cultures outside the animal body. The other pertains to the human immune serum used in preparing the vaccine, and is the feature which still makes it impossible to vaccinate humans against yellow fever on a large scale. The serum must be purchased from donors, which makes the cost of a single vaccination high. In addition, the protective property of the serum does not remain at a high level for long after the person has recovered from the disease. Consequently there is a rather limited supply. Efforts to obtain immune serum from immunized animals, such as is done in the case of other protective vaccines, are now under way at the Rockefeller Foundation's laboratories.

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Science News Letter, November 7, 1936

White gold being scarce in Germany, dentists there are using more white metal alloys for crowns, fillings, and other dental work.

ARCHAEOLOGY

Digging Up India's Past Reveals "Modern" Houses

AMERICAN archaeologists have unearthed a buried city in India, showing more vividly than ever before what the most ancient civilization of India was like.

The ruins, found under mounds of earth at Chanhu-daro, northwestern India, date back five thousand years in their oldest era. The modern world can find much to wonder at, in ruins and relics of the dead city.

Chanhu-daro had homes of burnt brick, and the brick was of well-fired clay and well shaped. The houses had bathrooms and drains that are pronounced superior to the sanitary arrangements in cities of other civilizations of their time. The people were industrious at many lines of skilled labor. They made toys for children of cities around the country. They were workers in bronze and copper. They turned out quantities of beads, making some so tiny that forty to an inch could be strung, and boring holes so fine that nothing coarser than a hair would thread these beads.

As Chanhu-daro was on a trade route, the goods of the city were dispatched by ox-load or peddler's pack to other, distant cities.

The picture of a trade town of ancient India, as old as the famous ruined city of Mohenjo-daro, is the result of excavation by two institutions, the Boston Museum of Fine Arts and the American School of Indic and Iranian Studies. It is only within three years that the Indian government has changed its law, to permit outside universities and archaeological organizations to dig in this region.

The Indus Valley, where Chanhu-daro stood, had its trouble with floods, like Ur of the Chaldees and many another ancient town. The field director of the expedition, Ernest Mackay, finds that at least three great floods attacked the city. After such a flood, the people

RADIO

November 10, 5:15 p.m., E.S.T.

HOW MUCH?—Ralph W. Smith of the National Bureau of Standards.

November 17, 5:15 p.m., E.S.T.

A CENTURY OF INVENTIONS—Thomas Midgley, Jr., Chairman, Executive Committee, Centennial Celebration of the American Patent System.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

were forced to leave the place entirely, and in some sequences of the city's history debris piled over the abandoned ruins before settlers came to rebuild.

After the Harappa culture, as the oldest civilization at this site is named, there followed a people of about 2000 B.C. who lived in matting houses, and had only rough paving under their feet. These people made great quantities of pottery which the archaeologists hope will shed more light on the migrations and trade relations of their era.

Chanhu-daro seems to have had its greatest importance early. The later settlements shrank. Last on the site were a few primitive folk who made dark gray pottery and marked it with geometric designs. This curious ware is unfamiliar even to archaeologists well acquainted with the clay styles of the past. Wandering gypsy-like tribes, Mr. Mackay believes, may have been the last industrialists in the once-flourishing trade city.

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From Page 291

painted too, but with eyes and toe- and finger-nails of mother-of-pearl.

At some ancient time, however, the last incense was burned, and then the rooms were packed with earth and rock. The temple together with the pyramid on which it stood were covered over, and made into the solid core of what is now known to the Indians as the Pyramid of Kukulkan, the "Bird-Snake," great god or king who ruled in Yucatan a few centuries before Columbus came. The Spaniards always called it "El Castillo," The Castle, because there they fortified themselves in their first tragic effort to conquer the peninsula of Yucatan, when the Aztec mainland of Mexico had already been overcome by Cortes.

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PALEONTOLOGY

Dinosaurs Will Have Place Among Mountain Sculptures

New Project Provides for Showing Ancient Beasts in Stone Right Where They Have Lain for Untold Ages Past

STATESMEN and soldiers will not have a monopoly on mountainside sculpture when a new joint project of the U. S. National Park Service, the State of Utah, and the American Museum of Natural History is completed. Much earlier inhabitants of America than any Revolutionary or Civil War notable will also have their carven places in the rock strata of the West.

This new project will have the added distinction of presenting not merely lineaments in stone, of originals who lie buried elsewhere, but will show the originals themselves, in stone, in the place where they have lain buried for almost unimaginable ages. The subjects of the new mountain-sculpture are the mighty dinosaurs that ruled the American West during Jurassic times, 140,000,000 years ago. Their fossil remains cram the rocks of Dinosaur National Monument in Utah, like raisins in a pudding.

Already the project is well advanced into the roughing-out stage. Under the direction of scientists of the American Museum of Natural History, various groups of emergency workers have carved a great cut into some of the most promising strata. The excavating work has now been taken over by the National Park Service, and will be pushed to conclusion as rapidly as possible.

When the rock layers containing the dinosaur bones have been suitably exposed, museum specialists of the American Museum, using air chisels, will carry on the critical job of carving away the stone matrix in which the fossils are embedded, leaving them exposed in bold relief. This is an especially touchy job, in some ways more difficult than that of the conventional sculptor, for the museum chiselmen must follow the lines of a model unknown to them until they actually uncover it, millimeter by millimeter.

Finally, when the great job of carving a stretch of artificial cliff 190 feet long and 30 feet high has been polished off, the National Park Service will erect a great building over the whole thing, to protect the exposed fossils from the weather. The rock wall itself will form the north wall of the building, and on the opposite wall will be a great mural painting showing how the creatures looked in life.

The State of Utah will develop a road to enable people to reach this unique educational exhibit, and the National Park Service will provide the necessary water system, maintenance buildings, parking grounds, and general facilities for handling the great crowds of people who will certainly go out into the desert, there to behold and wonder over this vivid presentation of the story of the giants who were once in our earth.

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TECHNOLOGY

Paper Makers in China Making Use of Grass

CHINA, the world's first paper making country, is now so short on wood pulp that swamp reeds and grasses are being tried as paper materials.

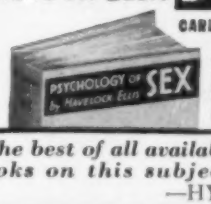
Despite political disturbances, experiments with these materials are going forward at Nankai University. One paper mill has obtained a patent on making paper from reeds.

Science News Letter, November 7, 1936

PSYCHOLOGY OF SEX

by HAVELOCK ELLIS

ONE VOLUME • UNABRIDGED



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SOIL SCIENCE

NATURE RAMBLINGS

by Frank Thone

The Endowment of Roots

PLANTS are workers, earners, creators of real wealth, all their lives. They take the low-value minerals of the soil, the almost valueless carbon dioxide of the air, the unpriced yet priceless water, and finally the intangible gold of sunlight, and weave it all into food and framework tissue. Some the plant is permitted to use for itself, some is appropriated by hungry humans, animals, fungi, bacteria—uncreating exploiters, all of us.

That the dead plant returns to the dust from whence it came is a commonplace. The least observant, least scientific of us realizes that. We see the dead leaves on the ground, the crop of clover or cowpeas plowed under by the farmer. We realize, at least in a vague general way, what it is all about.

But probably few of us ever take time to notice the role of the roots that are left in the soil when the top of the plant dies. These, no less than the overground parts, were created out of the same raw materials, contain much the same finished products, are capable of enriching the soil in the same way.

Indeed, they are already in place to do their best work of soil enrichment—they do not even need to be plowed under, or to be carried down by the combined activities of decay organisms and rain, as do the decaying leaves and stems. They can be acted on right where they are, and when the fungi and bacteria and small nameless animals have done their work, the final product, humus, is exactly where it is needed by the next generation of roots that send their living finger-feeders down through the soil.

It is a significant thing that the topsoil which conservationists are nowadays so anxiously talking about, and working about, is in most places practically identical with the depth to which the great mass of roots penetrates. "Thin" soils are found in places of shallow root penetration, "deep" soils where plants found conditions favorable, through long ages, and sent their roots down farther. The dark "A horizon," that is the really valuable part of a soil, is marked out by the roots, and partly made by them.

This dark zone on top of the soil is what makes human life possible on the millions-scale known to civilization, because it makes large-scale production of food possible. Our very lives are the endowment of the roots.

Science News Letter, November 7, 1936

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of those taking part in the experiment declared that the feat was impossible, they all found that they were able to make this judgment of a tone just half as high as another and a numerical scale of psychological pitch was made up in this way. Further experiments indicated that the apparent size of just perceptible increases in pitch remains constant regardless of their location on the scale. This is just the reverse of the way sound intensities are heard. The smallest loudness difference that can be perceived depends upon the intensity of the first sound heard.

It would seem that pitch and intensity are not perceived by the same type of physiological mechanism, the investigators concluded. Loudness appears to depend upon the total number of fibers stimulated in the auditory nerve. Pitch depends upon the location of that stimulation on the basilar membrane, they hold.

When a person picks out a tone he feels is just half as high in pitch as another, he picks one that stimulates a portion of the membrane just halfway between that stimulated by the first tone and the end of the membrane.

Science News Letter, November 7, 1936

*First Glances at New Books

Additional Reviews On Page 304

Hydrology

FRESH AND BRINY, THE STORY OF WATER AS FRIEND AND FOE—Frances Rogers and Alice Beard—*Stokes,* 309 p., $2. An easily flowing presentation of some of the principal importances of water: for drinking and washing, for navigation and irrigation, in its manifestations in natural objects both living and non-living. Some of the stories are real thrillers, and many of the line drawings are amusing.

Science News Letter, November 7, 1936

Geology

GEOLOGY OF THE TAMPICO REGION, MEXICO—John M. Muir—*American Association of Petroleum Geologists,* 280 p., $3.50 to members of the Association, $4.50 to others. Detailed description of one of the most important of North American petroleum areas. A bibliography of 212 titles on Mexican oil fields is a valuable additional feature.

Science News Letter, November 7, 1936

Nature

NATURE LORE, OR LISTEN TO THE VOICE OF NATURE, Vol. I—H. P. von W. Kjerschow Agersborg—*John S. Swift Company,* 178 p., 75c. Interestingly chatty little essays on a number of things found outdoors, ranging from quail and grouse to fish and snakes, with a somewhat longer discourse on How to Build Your State. The author is a biologist in the National Park Service. Published in planograph, the book is announced as Volume I of a series.

Science News Letter, November 7, 1936

Ethnology

MYTHS OF THE OWENS VALLEY PAIUTE—Julian H. Steward—*Univ. of California Press,* 439 p., 75c. Magic is a favorite theme in these stories told by Indians of eastern California. Dr. Steward has collected 47 myths and includes several of the songs that are used in unique fashion in the story telling of these Indians.

Science News Letter, November 7, 1936

Chemistry

RECENT ADVANCES IN GENERAL CHEMISTRY—Samuel Glasstone—*Blakiston's,* 430 p., illus., $5. Continuing the author's "Recent Advances" series of review books in the various sciences is this newest volume. The first 51 pages summarize for students of general chemistry the advances in nuclear disintegration and show the growing trend to offer chemists the basic facts of the new physical discoveries. Frequent reference is made to author's companion volume, "Recent Advances in Physical Chemistry."

Science News Letter, November 7, 1936

Chemistry

FUNDAMENTALS OF QUALITATIVE CHEMICAL ANALYSIS—Roy K. McAlpine and Byron A. Soule—*Van Nostrand,* 325 p., $2.40. A University of Michigan text which attempts to link more closely the lecture room and the laboratory. Class discussion on specific assignments rather than formal lectures is favored.

Science News Letter, November 7, 1936

Physics

MASTERY UNITS IN PHYSICS—Michael N. Idelson—*Colonial Book Co.,* 250, 38 p., paper 67c., class price 50c., cloth $1.00, class price 75c. A compact study text containing the basic requirements of high-school physics.

Science News Letter, November 7, 1936

Naval History

OUR NAVY, AN OUTLINE HISTORY FOR YOUNG PEOPLE—Charles J. Finger—*Houghton Mifflin,* 188 p., illus., $2. Stories of the exploits of the American Navy, from sailing ships to the days of aircraft. Most of the space is devoted to the wooden ships and the iron men who sailed and fought them.

Science News Letter, November 7, 1936

General Science

GENERAL SCIENCE FOR TODAY; Rev. Ed.—Ralph K. Watkins and Ralph C. Bedell—*Macmillan,* 715 p., $1.72. This revision takes advantage of the things of science and technology that have got into the news, like the China Clipper and the latest stratosphere flight, to point its moral and adorn its tale.

Science News Letter, November 7, 1936

Photography

THE AMERICAN ANNUAL OF PHOTOGRAPHY, 1937, Volume 51—Frank R. Fraprie, Ed.—*American Photographic Publishing Co.,* 324 p., $1.50 paper, $2.25 cloth. With many beautiful halftone reproductions of exceptional photographs, useful chapters on photographic technique, and lists of interest and value to photographers, this volume easily maintains the high standards set by its fifty predecessors.

Science News Letter, November 7, 1936

Biography

VOLTAIRE — Alfred Noyes — *Sheed and Ward,* 643 p., $3.50. The vulgar notion that Voltaire was a thoroughgoing atheist and scoffer receives very rough treatment at the hands of one of the most eminent of living poets. The great Frenchman emerges looking a good deal like Erasmus.

Science News Letter, November 7, 1936

Science

A LEARNING GUIDE IN GENERAL SCIENCE—Philip A. Boyer, Arthur S. Clark, Hans C. Gordon, John Shilling—*Lyons and Carnahan,* 225 p., illus., 51c.

Science News Letter, November 7, 1936

Zoology

A LABORATORY MANUAL FOR GENERAL ZOÖLOGY—Katherine McClure Roehl in collaboration with H. H. Newman—*Macmillan,* 99 p., $1.

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•First Glances at New Books

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Biography

AUDUBON—Constance Rourke—*Harcourt, Brace,* 342 p., 12 colored Audubon plates, illus. by James MacDonald, $3. The story of one of America's greatest naturalists—the greater since he was a pioneer—dramatically told and strikingly illustrated. Whether you are a naturalist, or one intrigued by the thrills and hardships of adventurous frontier life, or a lover of beautifully made books, you will want Miss Rourke's *Audubon.*

Science News Letter, November 7, 1936

Animal Husbandry

FEEDS AND FEEDING: A HANDBOOK FOR THE STUDENT AND STOCKMAN. (20th ed.)—F. B. Morrison—*Morrison Pub. Co., Ithaca, N. Y.,* 1050 p., $5. This book is literally a one-volume encyclopedia on a special subject of tremendous importance in the rural economy of America. Apparently the author has overlooked nothing; he goes into patient detail on what to feed, what the animal will make out of the feed, sources of supply, costs and returns, feeding in relation to breeding, and a score of other points both technical and practical. There are many excellent halftone illustrations.

Science News Letter, November 7, 1936

Chemistry

PRINCIPLES OF CHEMISTRY (4th ed.)—Joseph H. Roe—*Mosby,* 475 p., $2.75. New revised edition of one of the popular texts of chemistry for nurses, students of home economics and applied chemistry. The author is professor of biochemistry at George Washington University. Inorganic, organic and physiological chemistry are discussed.

Science News Letter, November 7, 1936

Travel

SKYWAYS TO A JUNGLE LABORATORY, AN AFRICAN ADVENTURE—Grace Crile—*Norton,* 240 p., plates, $2.75. An air travel log from London over the Great Rift Valley in Africa and back again, as recorded in words and many pictures by the wife of the Cleveland surgeon.

Science News Letter, November 7, 1936

Aluminum

ALUMINUM PAINT AND POWDER: (2nd rev. ed.)—Junius David Edwards—*Reinhold,* 216 p., illus., $4.50. As assistant to the director of research of the Aluminum Corporation of America the author describes with authority the applications of aluminum in the paint industry. The book is issued in connection with the celebration in the present year of the fiftieth anniversary of Charles Martin Hall's invention of the commercial process for making aluminum cheaply.

Science News Letter, November 7, 1936

Chemistry—Physics

HANDBOOK OF CHEMISTRY AND PHYSICS, A READY-REFERENCE BOOK OF CHEMICAL AND PHYSICAL DATA: (21st ed.)—Charles D. Hodgman, Ed.—*Chemical Rubber Co.,* 2,023 p., $6. The newest edition of this most popular reference handbook for scientists and science students includes 175 pages of new composition involving complete revision of several important tables. In actual bulk it is only slightly larger than the 20th edition; the gain is 64 pages.

Science News Letter, November 7, 1936

Mathematics

INTRODUCTION TO THE MATHEMATICS OF BUSINESS—William L. Hart—*Heath,* 321 p., 20 p. of answers, 80 p. of tables, $2.60. The basic mathematics needed for a student of business administration. The prerequisites include one year of algebra and the mental maturity of a college freshman.

Science News Letter, November 7, 1936

Physics

VIBRATION AND SOUND—Philip M. Morse—*McGraw-Hill,* 351 p., $4. A text for undergraduate students of physics and electrical communications. Prof. Morse endeavors to derive every fundamental equation needed in the science of vibrating systems. There are few exceptions.

Science News Letter, November 7, 1936

Medicine—Pharmacology

AN INTRODUCTION TO MATERIA MEDICA AND PHARMACOLOGY—Hugh A. McGuigan and Edith P. Brodie—*Mosby,* 580 p., 71 illus., 18 color plates, $2.75. A textbook for students of nursing which should give the student a very thorough and comprehensive knowledge of the subject.

Science News Letter, November 7, 1936

Sociology

MIGRATION AND ECONOMIC OPPORTUNITY—Carter Goodrich, Bushrod W. Allin and others—*Univ. of Pennsylvania Press,* 763 p., $5. Now that America is a filled continent, the shift and drift of populations is a matter of more general importance than it used to be, in the days when folk with unsolvable problems just went away from them and headed into the empty West. Whether we shall be able to plan and control such movements is now a matter of hot partisan controversy; but there can be no denying the desirability of at least understanding the movements of human masses as conditioned by such things as the exhaustion of a coal or oil field or the opening up of a new industrial area. The symposium here presented is a serious effort in that direction.

Science News Letter, November 7, 1936

Marine Biology

THE HABITAT AND FOOD OF THE CALIFORNIA SEA MUSSEL—Denis L. Fox, Ed.—*Univ. of California Press,* 64 p., 75c.

Science News Letter, November 7, 1936

Home Economics

HOME CANNING OF FRUITS, VEGETABLES, AND MEATS—Louise Stanley and Mabel C. Steinbarger—*Govt. Print. Off.,* 5c. Free copies may be obtained direct from U. S. Bur. of Home Economics, Washington, D. C.

Science News Letter, November 7, 1936

Medical Sociology

PROCEEDINGS OF THE 1935 ANNUAL CONFERENCE OF THE NATIONAL SOCIETY FOR THE PREVENTION OF BLINDNESS—*National Society for the Prevention of Blindness, Inc.,* 173 p., $1.

Science News Letter, November 7, 1936

Health

HEALTH FOR BODY AND MIND—Walter F. Cobb—*Appleton-Century,* 534 p., $1.60. A text for high school children written by the medical examiner in the department of hygiene of the College of the City of New York.

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